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ABSTRACT

This study examined relationships between students' cooperative learning experiences (including both the frequency and quality of their interactions in small groups) and their attitudes toward school; perceptions of the classroom environment; intrinsic motivation; and various social attitudes, skills, and values. Participants (n=756) were teachers and students from 35 third- through sixth-grade classrooms at six elementary schools in three school districts located in the San Francisco Bay (California) area. Small group interaction; student attitudes toward school; student perceptions of the classroom environment; student attitudes and beliefs about learning and cooperative learning; student social attitudes, skills and values; peer relations; social adjustment; self-esteem; intrinsic motivation; and academic achievement were measured through a variety of methods and questionnaires. The findings revealed that students in all classes in all three districts had had at least some experience with small group learning, and that the effects of cooperative learning on students' academic and social development were a function of the quality of the group interaction. These results demonstrate the importance of directly examining interaction processes within groups to improve understanding of the effects of cooperative learning, as well as to help to ensure that cooperative learning is used effectively in classrooms. (NB)

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Cooperative Learning, Intragroup Dynamics, and Student Outcomes

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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Cooperative learning is becoming more and more widespread in education. During the last ten years, a number of cooperative learning methods have been developed and disseminated in the United States and Canada, as well as Israel and parts of Europe (Aronson et al, 1978; Cohen, 1986; Johnson & Johnson, 1984; Sharan & Sharan, 1976; Slavin, 1986), and small group approaches to instruction have been applied to virtually all aspects of the curriculum. Although relatively few teachers as yet use cooperative learning as their *primary* instructional method, cooperative learning is now used at least occasionally in many classrooms, and its use seems likely to increase.

The popularity of this instructional strategy is attributable, in large part, to a sizeable body of research demonstrating that the effects of cooperative learning on students' academic achievement and social development often exceed those of other instructional strategies (see Johnson & Johnson, 1989; Johnson et al, 1981; Sharan, 1980; Slavin, 1983a). As Slavin (1983a) remarked, "regardless of the particular measure involved, about two-thirds of the cooperative learning studies that investigate any positive outcome find a positive effect on it" (p. 121). Yet, while this generalization seems well-supported, it is also clear that cooperative learning does not *invariably* lead to positive outcomes.

Despite the now voluminous body of research on cooperative learning, little is known about *why* cooperative learning is effective. There has been considerable theoretical speculation about the causal mechanisms underlying the effects of cooperative learning, but few studies have examined interaction processes in cooperative learning groups, or have attempted to see if differences in within-group interaction are related to differences in students' academic and/or social outcomes (Webb, 1982). The small amount of research that has been done in this area has focused almost exclusively on relationships between cognitive aspects of the verbal behavior of individual group members and their academic achievement. For example, achievement has been found to be positively related to giving and receiving elaborated explanations (e.g., Peterson & Swing, 1984; Webb, 1988) and engaging in reasoned disagreement (e.g., Lindow, Wilkinson, & Peterson, 1985; Smith, Johnson, & Johnson, 1981) in cooperative groups.

Very few studies have examined group-level variables, affective processes, or nonverbal aspects of interaction in cooperative learning groups; or relationships between group processes and outcomes other than achievement. This is surprising, since there has been much speculation (and some empirical support: see Sharan & Shaulov, 1990) that the effects of cooperative interaction on achievement are mediated by effects on affective variables such as anxiety and liking for the group, as well as motivational variables (Webb, 1982). Indeed, it is presumably the *quality of interpersonal interaction* that accounts for both the academic and social benefits of cooperative learning (Johnson, 1980; Johnson & Johnson, 1989). Obviously, simply placing students in groups to work together, even under a cooperative incentive and/or task structure, does not ensure that they will engage in the kinds of positive interactions that promote learning and liking (Johnson & Johnson, 1990; Slavin, 1983b).

The research presented here examines relationships between students' cooperative learning experiences (including both the frequency and quality of their interactions in small groups) and their attitudes toward school, perceptions of the classroom environment, intrinsic motivation, and various social attitudes, skills and values. Some limited findings with respect to achievement are also presented.

Method

The data were collected as part of the evaluations of two large-scale educational intervention programs that have been conducted in three northern California school districts over the past few years. Both of the intervention programs involve the use of cooperative learning, and include other features as well. In order to avoid the possible confounding effects of these other features, the present research was limited to teachers and students from schools that served as a comparison group for one or the other of the intervention programs. Although these teachers did not receive training in cooperative learning through these projects, some of them had previously received training in one or more methods of cooperative learning, and all used student learning groups at least occasionally.

Subjects

Participants were teachers and students from 35 third through sixth grade classrooms at 6 elementary schools in three school districts. All three of the districts are located in the San Francisco Bay area. *District 1* serves a suburban community with a primarily white, middle to upper-middle class population. Students at these schools regularly score in the top 10-20% of students in the state on standardized achievement tests. The District 1 sample consisted of teachers and students (n = 107) from 5 sixth grade classrooms at two schools during the 1988-89 academic year.

Districts 2 and 3 are located in urban communities with ethnically and socioeconomically heterogeneous populations. Minority populations in these schools range from 50% to 70% (primarily Hispanic). From one-quarter to one-third of the students are limited- or non-English speaking, and many are from families with incomes at or below the poverty level. On standardized achievement tests, from 30% to 45% of the students in the District 2 schools score in the lowest quartile of the state distributions on reading, language and mathematics. The District 2 sample consisted of teachers and students (n = 264) from 13 fourth through sixth grade classrooms at two schools during the 1987-88 academic year. The District 3 sample consisted of teachers and students (n = 385) from 17 third through sixth grade classrooms at two schools during the 1987-88 academic year.

Measures

Small group interaction. Information about the frequency and quality of students' participation in learning groups was obtained in several ways. In Districts 1 and 2, each classroom was visited periodically during the school year by trained observers, who used a structured observation instrument to record information about classroom organization and activities, and the behavior of teachers and students. Each classroom visit lasted for approximately two hours, during which time several observation forms would be completed. The percentage of observation periods in which students were seen working in groups was used as a measure of the *frequency* of group activities. A measure of the *quality* of students' group interactions was obtained by averaging observers' ratings of the extent to which students were affiliative, collaborative, helpful, and showed concern for one another when working in groups (alpha = .89).

Other measures of the frequency of cooperative learning activity were obtained from teacher and student questionnaires administered during the spring of the school year. Students in all three districts indicated (on five-point scales ranging from "never" to "every day") how often they worked in groups of 3 - 5 students in which (a) students helped each other with individual work, and (b) students worked together on a single group project, report, or answer sheet. Teachers in Districts 1 and 2 also indicated the amount of time their students usually spent in each of these two types of groups during a "typical" two-week period.

Students in Districts 1 and 3 also described the quality of their interactions in learning groups by indicating the extent to which each of a variety of descriptions was true of members' behavior in their groups (e.g., talk about and practice good ways to work together; ask each other for help when they need it; explain the reasons for their opinions). Responses to negative items (e.g., get angry when others disagree; argue about who gets to be the leader) were reflected, and the average of all responses was taken as a measure of the quality of group interaction (alpha = .88, .68, for Districts 1 and 3, respectively). Student reports of the quality of group interaction were not obtained in District 2, nor were teachers' reports of the quality of their students' interaction in learning groups obtained in any of the districts.

Student outcomes. With the exception of the measures of student achievement, all student outcome measures were obtained through questionnaires administered during the spring of the year. (The student measures of frequency and quality of group interaction were obtained from these same questionnaires). Although there is some overlap in the measures obtained from students in each district, particularly for Districts 1 and 2, most of the outcome variables were different from district to district. Collectively, the student questionnaire measures encompass several domains, including attitudes toward school, perceptions of the classroom environment, attitudes and beliefs about learning and cooperative learning, social attitudes, skills and values, peer relations and social adjustment, self-esteem and intrinsic motivation. A list of these variables, their sources, and some sample items are shown in Table 1.

Student *academic achievement* was assessed in Districts 1 and 2, using different measures in each district. In District 1, achievement was assessed with a measure of *Reading Comprehension*, adapted from a measure developed by ETS. Students read short passages and then responded to several open-ended questions about the meaning of the passages. The responses were scored for depth of comprehension and "higher-order" thinking (e.g., use of reasoning). Achievement was assessed in District 2 with the *California Test of Basic Skills* (CTBS).

Results

Frequency and Quality of Small Group Interaction

Table 2 presents mean scores for frequency and quality of small group interaction in the three districts. As expected, students in all classes in all three districts had at least some experience with small group learning.

Group Interaction and Student Outcomes

The classrooms in each of the two districts where observational measures of group interaction were available (Districts 1 and 2), were classified as high or low in frequency and quality of interaction based on median splits of the observation scores. The relationships between frequency and quality of interaction and student outcomes in each district were examined through 2 (low versus high frequency) by 2 (low versus high quality) multivariate analyses of variance. These analyses yielded a significant multivariate Frequency X Quality interaction in both District 1 ($F(9,85) = 2.87$, $p = .005$) and District 2 ($F(12,241) = 2.47$, $p = .005$), and a significant multivariate effect for Quality in District 1 ($F(9,85) = 1.99$, $p = .05$). There were no significant main effects for frequency of interaction in either district. Mean scores on the student outcome variables in each district, broken down by observed frequency and quality of interaction, are presented in Table 3.

Univariate analyses yielded significant Frequency X Quality interactions for *Positive Classroom Environment* and *Responsible Work Atmosphere* in District 1 ($Fs(1,93) > 6.07$, $ps < .02$), and for *Positive Classroom Environment*, *Intrinsic Prosocial Motivation*, *Concern for Others*, *Democratic Values* ($Fs(1,252) > 4.99$, $ps < .03$), and *Liking for School* ($F(1,252) = 3.52$, $P = .062$) in District 2. As shown by the pattern of means in Table 3, these findings indicate that increasing the frequency with which students work in groups only has positive effects when the quality of interaction is high. Conversely, when quality of interaction is low, increasing the frequency of interaction leads to *poorer* outcomes. In two-thirds of the comparisons in Table 3, student outcome scores are lowest in the high frequency - low quality cell. On the other hand, with the exception of *Empathy* in District 1 ($F(1,93) = 2.72$, $p = .10$), high quality of interaction generally is not associated with more positive outcomes in either district when frequency of interaction is low.

The analysis of *CTBS achievement test scores* in District 2 was conducted using residualized change scores in order to control for students' prior levels of achievement. This analysis indicated that achievement was significantly related to the quality of group interaction ($F(1,158) = 4.88$, $p = .03$). Student achievement was higher in high quality classrooms ($M = 705.53$, $M_{residual} = 2.25$) than in classrooms where the quality of group interaction was low ($M = 684.56$, $M_{residual} = -8.18$). Neither the main effect for Frequency of interaction nor the Frequency X Quality interaction were statistically significant.

A comparable analysis of students' *reading comprehension* scores in District 1 (controlling for prior achievement) did not yield significant main effects for either Frequency or Quality of interaction, nor a significant Frequency X Quality interaction. In contrast to the findings for District 2, then, group interaction (at least as assessed through class-level observational measures), had no reliable effects on student achievement in this sample.

Although the observational measures do appear to capture some meaningful variation in student outcomes, class-level measures may not represent some students' experiences very well, particularly with respect to quality of interaction. Consequently, a second set of analyses of student outcomes was conducted using students' own reports of the frequency of their group activity and the quality of their groups' interactions as the independent variables.

Simple correlations and standardized regression weights from multiple regression analyses for student outcomes in Districts 1 and 3 are presented in Table 4. These findings indicate that the effects of participation in learning groups on student outcomes are due almost entirely to the quality of interaction. The simple correlations with the outcome measures are invariably of greater magnitude for quality than for frequency of interaction and, with few exceptions, only quality of interaction is significantly related to student outcomes in the multiple regression analyses. The exceptions (in District 1 only) involve school-related attitudes—perceptions of the classroom environment and liking for school. Also, in contrast to the findings from the analyses using class-level observational measures, quality of interaction is significantly and positively related to students' reading comprehension scores (controlling for prior achievement).

Given the significant interaction of frequency and quality of group interaction found in the analyses using class-level observational measures, it seemed important to explore whether similar effects would be found in the analyses based on reports of individual students. Consequently, the relationships between frequency of small group interaction and student outcome variables in Districts 1 and 3 were examined separately for students who reported that the quality of interaction in their groups was low versus high (based on a median split of quality of interaction scores). In District 1, where frequency of interaction was significantly associated with some of the outcome measures, these analyses indicated that frequency of interaction was positively related to student outcomes *only* when quality of interaction was high; when quality of interaction was low, frequency of interaction was uncorrelated with student outcomes (rs = -.08 - .07, $ps > .61$). In District 3, where frequency of interaction generally was unrelated to student outcomes, this remained true when students were separated into low and high quality of interaction groups.

Discussion

The major finding of this research—that the effects of cooperative learning on students' academic and social development are a function of the quality of group interaction—is hardly surprising. Despite the diversity among existsting approaches to cooperative learning, none assume that simply increasing the frequency with which students work together in groups is likely to have beneficial effects, and most incorporate explicit procedures for improving students' group interaction and management skills, and for creating and maintaining group norms of interpersonal concern and cooperation (e.g., Cohen, 1986; Johnson & Johnson, 1984; Sharan & Sharan, 1976; Solomon et al., 1990). Even among approaches that emphasize group incentives rather than group process and structure (e.g., Slavin, 1986), the effects of cooperative learning on such outcomes as achievement have been explained in terms of intervening effects on group interaction variables, such as active involvement in group discussions and the provision of explanations to groupmates (e.g., Slavin, 1987).

Although this general finding may not break new theoretical ground, we believe that it has considerable practical importance. Currently, cooperative learning is widely regarded among educators to be an effective approach toward a variety of problems faced by schools, and it is being disseminated rapidly in the educational community. Without a clear understanding of the importance of

group interaction processes to student outcomes, cooperative learning may go the way of previous "innovations" in education—it will fail in most settings and disappear from classroom practice as rapidly as it appeared. This pessimistic prediction seems particularly likely for a complex instructional strategy such as cooperative learning. Most teachers have little training or experience in managing small groups effectively, with the result that students often may be placed in groups without adequate preparation for working together (cf. Sharan, 1990). The present findings indicate that some of the students who work in groups relatively often may not always have a positive experience when they do, and that these conditions are not associated with positive outcomes. If this is a common pattern in classrooms, many teachers will undoubtedly become disenchanted with cooperative learning and return to more "traditional" approaches to instruction.

The extent to which variations in the quality of group interaction were associated with differences in the particular approach to cooperative learning adopted by teachers cannot be determined from the present study. In fact, it is almost certain that at least some of the teachers in the present sample had not received any formal training in cooperative learning, suggesting that poor quality of interaction in learning groups may have been at least partly due to a lack of training. The findings from at least two recent studies, however, indicate that simply providing teachers with training does not ensure that students will function effectively in their groups, and that different approaches to cooperative learning are associated with general differences in the quality of interaction which, in turn, are associated with differential outcomes. Huber and Eppler (1990) examined interaction within cooperative learning groups using both observational measures and student reports of group process, and found that negative interactions (e.g., "freeloading," domination, competition, teasing) were quite common, and often exceeded positive interactions. More importantly, Huber and Eppler found that students whose approach to cooperative learning incorporated "team building" activities and discussion of group functioning rated the quality of their group interactions as improving significantly over time, whereas no such improvements were found among students whose apprach to cooperative learning relied on group incentives to motivate students to behave cooperatively. Similarly, Cohen, Lotan, and Catanzarite (1990) compared cooperative learning methods that either did or did not incorporate procedures for improving the quality of group interaction (e.g., training in group interaction skills, use of rotating roles). They found that approaches that explicitly attended to group process led to more equal participation among students, more frequent helping behavior, greater peer acceptance, and larger gains in achievement, particularly for low status children.

The present findings regarding the effects of low-quality interactions within learning groups on student outcomes were somewhat inconsistent, depending upon whether they were measured by class-level observations or individual-level self-reports. The class-level analyses found that frequent low-quality interactions were associated with negative outcomes, whereas the analyses using student reports indicated that participation in learning groups had no effects on student outcome variables when the quality of interaction was poor. Aside from the methodological differences that might account for this discrepancy, one possible explanation is that the observational measures represent more basic, socioemotional aspects of group functioning (e.g., affiliativeness, concern for others) than the student report measures, which focused more on the

effectiveness of the group process. Low scores on the observational measures thus would more clearly indicate negative, unpleasant group experience than would low scores on the student report measures.

Although limited in several respects, the findings from this exploratory study clearly demonstrate the importance of directly examining interaction processes within groups for improving our understanding of the effects of cooperative learning, as well as for helping to ensure that cooperative learning is used effectively in classrooms.

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Table 1

Outcome Variables Assessed Through Student Questionnaires

Attitudes Toward School

Liking for School (e.g., I like my school; I would be very sad if I had to go to a different school; 7 items, alpha = .75)

Perceptions of the Classroom Environment

Responsible Work Atmosphere (e.g., students in this class really try to do their best; 3 items, alpha = .82)

Positive Classroom Environment (e.g., students in my class work together to solve problems; my classmates care about my work as well as their own; 20 items, alpha = .83)

Attitudes and Beliefs About Learning and Cooperative Learning

Liking for Group Work (e.g., I really like working in groups; it makes you feel good to work in a group; 5 items, alpha = .74)

Social Learning in Groups (e.g., you learn to understand and appreciate other people by working in groups; 7 items, alpha = .70)

Cognitive/Academic Learning in Groups (e.g., I think I learn more working in groups than I do by myself; 6 items, alpha = .62)

Like to Help Others Learn (e.g., it makes me feel good to help someone learn something; 5 items, alpha = .81)

Attitude Toward Math (e.g., I like to figure out different ways to do a math problem; 10 items, alpha = .73)

Social Attitudes, Skills, and Values

Concern for Others (e.g., I think that everybody has enough problems of their own without worrying about other peoples' problems [reflected]; 6 items, alpha = .67)

Competitiveness (e.g., I'll do whatever I have to do to win; I get upset when someone does better than me; 11 items, alpha = .80)

Perspective-Taking and *Empathy* (Davis, 1980)

Social Competence (e.g., I usually know when people need help and what kind of help to give; I know how to disagree without starting a fight or argument; 17 items, alpha = .84)

Democratic Values (assertion responsibility, equality of participation and representation, and willingness to compromise; 14 items, alpha = .63)

Peer Relations and Social Adjustment

Popularity (e.g., I think most other children like me; other children like to play with me; 6 items, alpha = .77)

Loneliness/Social Dissatisfaction (Asher, Hymel, & Renshaw, 1984)

Social Anxiety (La Greca, Dandes, Wick, Shaw, & Stone, 1988)

Self-Esteem

General Self-Esteem (5 items, alpha = .78)

Academic Self-Esteem (5 items, alpha = .61)

Intrinsic Motivation

Intrinsic Prosocial and *Intrinsic Academic Motivation* (similar to measures developed by Connell & Ryan (1985); scored as the proportion of intrinsic to total reasons given for performing prosocial and academic behaviors)

Table 2

Frequency and Quality of Group Interaction

Variable	District 1	District 2	District 3
Mean Number of Observations	42.60	14.08	N/A
Mean Number of Groups Observed[a]	7.40	7.77	N/A
Mean % of Observations with Students in Groups[a]	17.08	57.20	N/A
Mean Reported Frequency of Group Activities (Students)[b]	2.66	3.37	2.71
Mean Reported Frequency of Group Activities (Teachers)[c]	2.50	2.08	N/A
Mean Observed Quality of Group Interaction[d]	2.48	2.11	N/A
Mean Reported Quality of Group Interaction (Students)[e]	2.99	N/A	2.50

[a]Includes pairs. Observed frequency significantly ($p < .05$) higher in District 2.

[b]Does *not* include pairs. Scale: 1 = *never*; 2 = *once in awhile*; 3 = *about once a week*; 4 = *a few times a week*; 5 = *every day*. Reported frequency significantly ($p < .05$) higher in District 2.

[c]Frequency during "typical" two-week period. Scale: 1 = *< 30 min/day*; 2 = *30-60 min/day*; 3 = *> 60 min/day*.

[d]Maximum score = 7.

[e]Maximum score = 4. Reported quality significantly ($p < .001$) higher in District 1.

Table 3

Mean Student Outcome Scores by Observed Frequency and Quality of Group Activities

Outcome	Quality	District 1 Frequency Low	District 1 Frequency High	District 2 Frequency Low	District 2 Frequency High
Liking for School	Low	51.20	46.98	50.55	47.90
	High	50.58	51.32	50.13	52.09
Responsible Work Atmosphere	Low	52.39_{ab}	45.33_{a}		
	High	49.58_{ab}	52.77_{b}		
Positive Classroom Environment	Low	50.64_{ab}	44.39_{a}	50.85_{ab}	46.59_{a}
	High	47.20_{a}	55.32_{b}	48.61_{a}	54.44_{b}
Like to Help Others Learn	Low			51.14	48.31
	High			50.03	50.05
Intrinsic Prosocial Motivation	Low	53.87	50.87	51.54_{ab}	47.16_{a}
	High	49.09	49.02	49.38_{ab}	52.08_{b}
Intrinsic Academic Motivation	Low	54.80	50.19	51.01	48.48
	High	49.36	49.58	50.17	50.94
Social Competence	Low			51.51	48.16
	High			50.91	50.32
Popularity	Low			50.33	49.43
	High			50.30	50.52
Concern for Others	Low			51.58	48.43
	High			48.81	51.49
Perspective-Taking	Low	49.94	50.81		
	High	50.57	49.12		
Empathy	Low	48.85	47.20		
	High	52.69	50.33		
Loneliness/Social Dissatisfaction	Low	51.38	50.39		
	High	48.76	50.24		
Social Anxiety	Low	50.92	52.66		
	High	48.00	49.36		

Table 3 (cont.)

Outcome	Quality	District 1 Frequency Low	District 1 Frequency High	District 2 Frequency Low	District 2 Frequency High
Democratic Values	Low			52.20	49.71
	High			47.80	50.92
General Self-Esteem	Low			49.13	48.73
	High			49.90	52.54
Academic Self-Esteem	Low			50.42	49.00
	High			50.71	50.21
Competitiveness	Low			50.02	50.54
	High			50.94	48.70

Note. Means that do not share a subscript differ significantly ($p < .05$) by Scheffe post-hoc comparison.

Table 4

Regressions of Reported Frequency and Quality of Group Interaction on Student Outcome Variables

Outcome	Predictor	District 1			District 3		
		r	Beta	R^2	*r*	Beta	R^2
Liking for School	Freq.	.33**	.204+				
	Qual.	.53**	.432**	.32**			
Responsible Work Atmosphere	Freq.	.49**	.278**	.48**			
	Qual.	.63**	.510**				
Positive Classroom Environment	Freq.	.54**	.350**	.62**	.08	.023	.18**
	Qual.	.71**	.550**		.42**	.418**	
Liking for Group Work	Freq.				.04	-.004	.13**
	Qual.				.35**	.364**	
Social Learning in Groups	Freq.				.11*	.057	.19**
	Qual.				.42**	.426**	
Cognitive/Academic Learning in Groups	Freq.				.12*	.087+	.11**
	Qual.				.32**	.306**	
Attitude Toward Math	Freq.				-.01	-.030	.02*
	Qual.				.15**	.150**	
Intrinsic Prosocial Motivation	Freq.	-.10	-.049	.01			
	Qual.	.11	.123				
Intrinsic Academic Motivation	Freq.	.15	.048	.21**			
	Qual.	.48**	.436**				
Perspective-Taking	Freq.	.22*	.064	.18**			
	Qual.	.42**	.383**				
Empathy	Freq.	.25*	.061	.29**			
	Qual.	.54**	.510**				
Loneliness/Social Dissatisfaction	Freq.	-.22*	-.061	.22**			
	Qual.	-.45**	-.435**				
Social Anxiety	Freq.	-.07	.176	.08+			
	Qual.	-.24*	-.327*				

Table 4 (cont.)

Outcome	Predictor	District 1			District 3		
		r	Beta	R^2	*r*	Beta	R^2
Reading Comprehension	Freq.	.09	.031	.11*			
	Qual.	.33**	.318*				

Note. *N*'s range from 72-90 in District 1, and from 382-385 in District 3. Frequency and quality scores are intercorrelated .47 ($p < .001$) in District 1 and .11 ($p < .03$) in District 3.

$^{+}p < .10$ $^{*}p < .05$ $^{**}p < .01$